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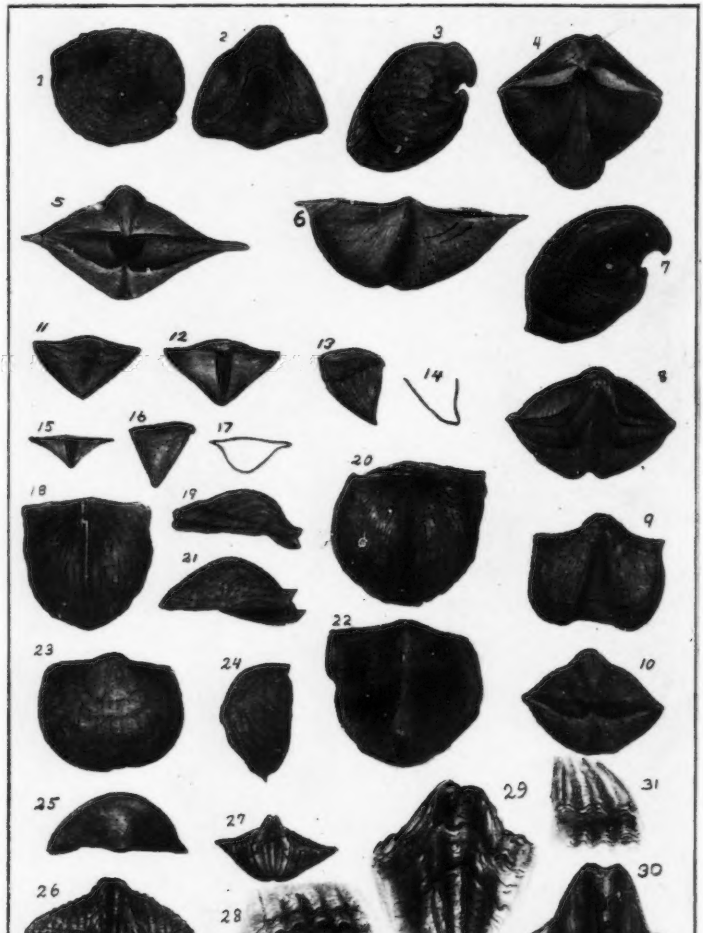

PLATE VIII.—WEBSTER ON NOTES ON THE GENUS ATRYPA.

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A Preliminary Report on the Uniondae of St. Joseph River.

BY FRANCIS WENNINGER

The following report was compiled from material collected by the Rev. A. M. Kirsch, C. S. C., Professor of Zoology in the University of Notre Dame. It represents the work of years of collecting, done during such time as could be spared from active duty in the lecture-room or laboratory. The measurements given are from specimens that are believed to be representative, and are all expressed in millimeters. The descriptions are based on the Mollusca of the Chicago Area, by Baker; the Mollusca of Indiana, by Call; and the synonymy is that of Charles Torrey Simpson as given in his Descriptive Catalogue of the Naiades or Pearly Fresh Water Mussels, published by Bryant Walker, Detroit, 1914.

Lampsilis Ventricosa (Barnes).

Unio ventricosus Barnes, Am. Jl. Sci., VI, 1823, p. 267, pl. XIII, fig. 14.
Mya ventricosus Eaton, Zool. Text-Book, 1826, p. 221.
Lampsilis ventricosus Baker, Moll. Chi. Pt. 1, 1898, p. 94.
Unio accidens Lea, Tr. Am. Phil. Soc., III, 1829, p. 435, pl. X. fig. 16.
Unio subovatus Lea, Tr. Am. Phil. Soc., IV, 1831, p. 118, pl. XVIII, fig. 46.
Unio cardium Conrad, New F. W. Shells, 1834, p. 68.
Unio fasciolus Ferrusac, Guer. Mag. 1835. p. 26.
Unio ovata Deshayes, An. sans Vert. 3rd. ed. 1839, p. 669.
Unio lenis Conrad, Monog., XII, 1840, p. 106, pl. LVIII, fig. 2.
Unio canadensis Lea, Proc. Acad. N. Sci. Phila., I, 1857, p. 85.
Unio dolabraeformis Sowerby, Conch. Icon., XVI, 1867, pl. LIX, p. 298.

The species was found in the St. Joseph River near Mishawaka, in 1913. The peculiar slope of the posterior portion of the shell as also the formation of the beak are characteristic of this shell. The shell is inflated, rather thin for its size and heavy. Its shape is elliptical rather than oval. The margin, especially in older specimens, is concentrically sculptured. The epidermis is shining and smooth,—characters that are both lost with age. There are

* January 20, 1921.—Pages 1 to 28.

from twenty to thirty-five or more bright green rays. In some specimens the rays do not persist in the posterior portion; when present in old specimens they become wide,—about eight millimeters; or there will be an alternation of a wide ray with a narrow one. The ligament is rather stout, short and wide and of a dark chestnut color. The cardinal teeth are double in the left valve and single in the right. The posterior muscle scar is rounded, as wide as long and not much impressed. The protractor pedis muscle scar is wider than long, deeply impressed anteriorly and coarsely striated. The pallial line is deeply impressed anteriorly but only slightly impressed posteriorly. The cavity of the beaks is deep. The nacre is silvery white with little or no iridescence; sometimes pink.

Length	125	Height	100	Diameter	60
	100		65		36
	118		84		52
	126		88		54

LAMPSILIS LUTEOLA (Lamarck).

Unio luteola Lamarck, An. sans Vert., VI, 1819, p. 79
Lampsilis luteolus Baker, Moll. Chi., Pt. I, 1898, p. 103, pl. XI, XXXVI fig. 12
Unio inflatus Barnes, Am. Jl. Sci., VI, 1823, p. 266.
Mya inflata Eaton, Zool. Text-Book, 1826, p. 221.
Unio siliquoideus Barnes, Am. Jl. Sci., VI, 1823, p. 269, pl. XIII, fig. 150.
Unio childreni Hanley, Biv. Shells. 1843, p. 193, pl. XXIII, fig. 57.
Unio hydianus Kuster, part. Conch. Cab. Unio, 1861, p. 201, pl. LXVII fig. 1.
Unio distans Anthony, Am. Jl. Conch., I, 1865, p. 156, pl. XIII, fig. 2.
Unio multiradiatus Sowerby, Conch. Icon., XVI, 1868, pl. LXI, fig. 306.
Unio affinis Sowerby, Conch. Icon., XVI, 1868, pl. LXI, fig. 307.

This form, quite abundant in the St. Joseph River, is variable in outline,—a fact that probably gave rise to the extensive synonymy that has been established on this shell. The shell is large, elongated and rather thin. It is rounded anteriorly and somewhat pointed posteriorly. The epidermis is a light horn color, often shading into brown on the posterior slope. There are many bright green, narrow rays, departing from the beaks and covering nearly three-fourths of the disk. The umbones are prominent, slightly elevated, of a brown or green color, usually eroded, and marked by fine undulating ridges. The ligament is stout, short and wide, and of a dark chestnut color. The cardinal teeth are double in both valves. The anterior adductor muscle scar is excavated, longer than wide, large and coarsely striated. The

posterior adductor muscle scar is as long as it is wide, large, shallow. The cavity of the beaks is quite shallow. The pallial line is uniformly impressed. The nacre is white and somewhat iridescent.

Length	90	Height	50	Diameter	34
	58		30		22
	65		39		27
	78		42		30
	83		44		27

LAMPSILIS LIGAMENTINA (Lamarck).

Unio crassus Say, Nich. Encyc., II, 1817, pl. I, fig. 8.
Mya crassa Eaton, Zool. Text-Book, 1826, p. 217.
Unio ligamentina Lamarck, Ann. sans Vert. Vol. VI, 1819, p. 72.
Margarita (Unio) crassus Lea, Syn. 1836, pl. 24.
Nephronajas ligamentina Ortmann, Ann. Car. Mus., VIII, 1912, p. 325
Unio ellipticus Barnes, Am. Jl. Sc. VI, 1823, p. 259, pl. XIII, fig. 19.
Unio carinatus Barnes, Am. Jl. Sc. VI, 1823, p. 259, pl. XI, fig. 10.
Unio ellipsarius Say, Am. Conch., VI, 1834.
Unio fasciatus Say, Am. Conch., VI, 1834.
Unio ligamentinus Lamarck, Anim. sans Vert., Vol. VI. p. 538, 1838.
Mya gravis Wood, Ind. Test. (Hanley) 1856, p. 199, pl. I, fig. 6.
Unio luteolus Sowerby, Conch. Icon., XVI, 1867, pl. LVIII, fig. 239a.
Unio delodontus Sowerby, Conch. Icon., XVI, 1867, pl. LVII, fig. 288.
Unio crassidens Sowerby, Conch. Icon., XVI, 1868, pl. LXII, fig. 312.
Unio pictus Sowerby, Conch. Icon., 1868, pl. LXII, fig. 313.
Unio venustus Sowerby, Conch. Icon., 1868, pl. LXIV, fig. 326.
Unio upsoni Marsh, Conch. Ex. I, 1887, p. 57.
Unio pinguis Lea, Pr. Acad. Natl. Sci., Phil. I, 1857, p. 84.
Lampsilis pinguis Simpson, Syn. 1900, p. 540.

The habitats of this animal are variable. It may be found indifferently in sluggish and muddy bayous, living in sand or mud; or it may live in the gravel of a swiftly moving stream. These differences in environment may account for variableness in form and coloration. The nacre is white, varying to bluish and pinkish iridescence. The shell is large and much thicker anteriorly than posteriorly. The umbones are not prominent. The epidermis is yellowish, straw-colored, or light green with numerous dark green rays extending from the umbones to the central margin. Old specimens are dark reddish brown and show the rays only near the umbones. The cardinal teeth are double in both valves; those in the right valve are unequal, the anterior being very small, the posterior large, triangular and crenulated; in the left valve the teeth are more nearly equal, triangular and crenulated. The lateral teeth are strong, heavy, elevated and curved towards the

ventral margin. The anterior adductor muscle scar is deeply excavated, longer than wide and strongly striated. The posterior adductor muscle scar is but lightly impressed, and in some specimens is highly iridescent. The pallial line is deeply impressed anteriorly but only slightly impressed posteriorly. This shell approaches closely to those of *Unio luteolus* and *Unio ventricosus*. It can be distinguished from *U. ventricosus* by its receding umbones, and it lacks the undulations that are so characteristic on the beaks of *luteolus*.

Length	117	Height	65	Diameter	32
	135		84		40
	122		72		36
	151		86		48
	127		73		36

LAMPSILIS RECTA (Lamarck).

Unio recta Lamarck, An. sans Vert., VI, 1819, p. 74.
Eurynia (*Eurynia*) *recta* Ortmann, Am. Car. Mus., VIII, 1912, p. 344, fig. 24.
Unio rectus Conrad, Monog., III, 1836, p. 33, pl. XV.
Lampsilis rectus Smith, Bull. U. S. Fish Com., 1899, p. 290, pl. LXXVIII.
Unio latissima Rafinesque, An. Gen. Sci. Phys. Brux. Pt. 13, V. 1820, p. 297, pl. LXXX. figs 14, 15.
Mya praelonga Eaton, Zool. Text-Book, 1826, p. 220.
Unio leprosus Miles, Rep. Geol. Sur. Mich., 1861, p. 240.

Observations and comparisons made on forty specimens in the museum at Notre Dame warrant the following descriptions and measurements. The shell is large, smooth and elongated; there is lateral compression and the shell is quite thick to very thick anteriorly. The epidermis is thick and blackish and obscurely rayed with numerous bands of green. These bands of color disappear in old specimens and are indistinct in some young ones. The cardinal teeth are double in both valves, those in the left valve are about equal in size. The anterior tooth in the right valve is so small as to be inconspicuous. The teeth generally are recurved posteriorly, stout, triangular and serrated. The lateral teeth are long, straight, lamelliform, elevated and crenulated. The anterior adductor muscle scar is wing shaped, longer than wide and very deeply excavated. The posterior adductor muscle scar is rounded, slightly impressed and concentrically striated. The pallial line is deeply impressed anteriorly, crenulated, but only slightly impressed posteriorly. The cavity of the beaks is very shallow. The nacre is variable showing all shades from pure white to a dark purple.

Length	50	Height	23	Diameter	10
	83		42		28
	93		44		26
	165		70		45
	175		75		48

Lampsilis Iris (Lea).

Unio iris Lea, Tr. Am. Phil. Soc., III, 1830, p. 439, pl. XI, fig. 18.
Lampsilis iris Baker, Moll. Chi., Pt. I, 1898, p. 105, pl. XIII, fig. I, XIV. 2.
Eurynia (*Micromya*) *iris* Ortmann, Ann. Car. Mus., VIII, 1912, p. 341, fig. 23.
Unio creperus Lea, Tr. Am. Phil. Soc., VI, 1838, p. 33, pl. X, fig. 28.
Unio novi-eboraci Lea, Tr. Am. Phil. Soc., VI, 1838, p. 104, pl. XXIV, fig. 114.
Unio cresserus Hanley, Test. Moll., 1842, p. 196.
Unio radiatus DeKay, Zool. N. Y., Pt. 5, 1843, p. 189, pl. XVII, fig. 236.
Unio subrostratus Kuster, Conch. Cab. Unio., 1861, p. 203, pl. LXVII, fig. 3.

But two specimens of this shell are available for description, and both are evidently quite young. The shells are characterized by the beautiful silvery white nacre which, posteriorly, becomes iridescent, the short erect teeth, the interrupted bands of green, and the foldings on the beaks. In outline, the shell is elliptically oval, thin, small and transversely compressed. The lines of growth are widely separated but conspicuous. The cardinal teeth are triangular, small and erect. They are double in the left valve and single in the right. The lateral teeth are long, thin straight and not much elevated. The anterior adductor muscle scar is deeply impressed; the posterior is slightly impressed and very iridescent. The pallial line is quite faint. The cavity of the shell is small and narrow; of the beaks, shallow and triangular.

Length	50	Height	26	Diameter	14
	37		19		11

Lampsilis Alata (Say).

Unio alatus Say, Nich. Encyc., II. 1817, pl. IV. fig. 2.
Lampsilis alatus Baker, Moll. Chi., Pt. I, 1898, p. 97, pl. XVIII.
Unio alata Lamarck, An. sans Vert., VI, 1819, p. 76.
Mya alata Eaton, Zool. Text-Book, 1826, p. 219.
Symphynota alata Lea, Tr. Am. Phil. Soc., III, 1830, p. 448.
Lymnadia alata Swainson, Treat. on Mal., 1840, p. 256, fig. 48.
Mysca alata Swainson, Exotic Conch., 2nd. ed., 1841, p. 28, pl. VII.
Metaptera alata Stimptson, Shells of N. Eng., 1851, p. 14.
Proptera alata Ortmann, Ann. Car. Mus., VIII, 1912, p. 333.

This is a large, oval shell, rather thin for its size and triangular when the alae are present. The umbonal slopes are rounded; the alate postero-dorsal margin is quite compressed. The ventral

margin is slightly rounded. The surface is smooth and shining with coarse lines of growth. The epidermis is yellowish-green and distinctly rayed in young specimens, but this color changes to a dark brown or even black in old specimens,—in these the rays may be partially or even entirely obliterated. There is a solid ligament of a light brown color. The cardinal teeth are double in both valves, about equal in size in the left valve, and unequal in the right. The lateral teeth are long thin, slightly arcuate and smooth. The pallial line is quite distinct. The anterior adductor muscle scar is deeply impressed and striated; the posterior adductor muscle scar is large, indistinct and confluent. The dorsal muscle scar is in the cavity of the beaks and arranged in nearly a straight row; there are six or seven small rounded pits, followed by a single long and narrow scar, very deeply impressed. The nacre varies from deep purple to salmon pink; iridescent. The species may be recognized by the rich purple interior and the more or less alate postero-dorsal margin.

Length	138	Height	93	Diameter	35
	92		71		23
	108		82		30

Lampsilis Leptodon (Rafinesque).

Unio (*Leptodea*) *leptodon* Rafinesque, Ann. Gen. Sci. Phys. Brux., V, 1820, p. 296, pl. LXXX, fig. 5-7.
Unio leptodon Say, Am. Conch., VI, 1834.
Symphynota lepiodon Ferrusac, Guer. Mag. 1835, p. 25.
Lampsilis leptodon Simpson, Syn., 1900, p. 575.
Anodon purpurascens Swainson, Zool. III., 1st. ser., III, pl. CLX, 1823.
Unio velum Say, New Harm. Dissem., II, Sept. 23, 1829, p. 293
Symphynota tenuissima Lea, Tr. Am. Phil. Soc., III, 1829, p. 453, pl. XI, fig. 21.
Unio tenuissima Hanley, Biv. Shells, 1843, p. 206, pl. XX, fig. 42.

This is one of the thinnest shells to be fouud in the St. Joseph River. The only shell that approaches it in appearance is Anodonta, the resemblance being in the poorly developed character of the teeth. The shell is small, smooth and elongately elliptical in outline. The epidermis varies from a light horn color strongly rayed with green in the young specimens, to a dark brown and even black color with no rays, in old specimens. The lines of growth are inconspicuous except along the ventral margin. The dorsal is straight; the anterior margin rounded; the posterior margin pointed. The umbones are small and hardly project above the

dorsal margin. The ligament is small, short, thin and hardly protrudes above the valves. The cardinal teeth are scarcely evident at all. The lateral teeth are single in both valves, long and straight. The pallial line is weakly impressed. The cavity of the shell is shallow; of the beaks, scarcely noticeable. The nacre is bluish to white; some specimens are spotted with yellowish brown.

Length	85	Height	45	Diameter	27
	68		35		22
	78		42		24
	57		28		18

Plagiola Donaciformis (Lea).

Unio donaciformis Lea, Tr. Am. Phil. Soc., III, 1828, p. 267, pl. IV, fig. 3.
Unio zigzag Lea, Tr. Am. Phil. Soc., III, 1829, p. 440, pl. XII, fig. 19.
Unio nervosa Conrad, New F. W. Shells, 1834, p. 70.
Unio nervosus Say, Am. Conch., VI, 1834.
Plagiola donaciformis Baker, Moll. Chi., Pt. I, 1898, p. 92. XIII, 4.

Only one specimen of this species is at my disposal. The specimen measures 54mm. in length, 33mm. in height, and 12mm. in diameter. The specific name was evidently given to this shell on account of its resemblance to the marine genus Donax. The species does not seem to be common in this locality as but one specimen was found. It is a small, thick shell that can be recognized by its zigzag epidermis, which, in the specimen before me is greenish and rayed with dark green. All the rays arise from the umbones and cover the entire disk. The shell is elliptically elongated, thick, solid and inflated. The lines of growth are indicated by obtuse ridges. The umbones are slightly elevated, much inflated, light brown in color, and marked by very fine ridges. There is a short ligament, rather wide and of a dark horn color. The cardinal teeth are double in the left and single in the right valve, small, elevated, narrow, somewhat triangular and coarsely serrated. The single tooth in the right valve is acutely triangular. The lateral teeth are long and directed ventrally. The anterior adductor muscle scar is longer than wide and deeply excavated. The posterior adductor muscle scar is barely visible. The pallial line is slightly impressed. The cavity of the beaks is rather deep. The nacre is silvery white and iridescent.

Anodonta Grandis (Say).

Anodonta grandis Say, New Harm. Diss., Vol. II, 22, p. 341, 1829.
Anodonta plana Lea, Tr. Am. Phil. Soc. 2nd. ser. Vol. V., p. 48, 1834.
Anodonta declivis Conrad, Am. Jl. Sci. & Arts, 1st. ser. Vol. XXV. p. 341, 1836.

Anodonta salmonia Lea, Tr. Am. Phil. Soc. 2nd. ser. Vol. VI, p. 45, 1836.
Anodonta decora Lea, Tr. Am. Phil. Soc., 2nd. ser. Vol. VI, p. 64, 1836.
Anodonta gigantea Lea, Tr. Am. Phil. Soc. 2nd. ser. Vol. VI, p. 1, 1838.
Anodonta ovata Lea, Tr. Am. Phil. Soc., 2nd. ser. Vol. VI, p. 2, 1838.
Anodonta harpethensis Lea, Tr. Am. Phil. Soc., 2nd. ser. Vol. VIII, p. 224, 1840.
Anodonta inornata Anthony, Am. Jl. Conch., Vol. II, p. 145, 1866.

The largest specimen of this species in the collection at my disposal was taken from St. Mary's Lake, Notre Dame,—about half a mile from the St. Joseph River. This shell, collected in 1914, measures 153mm. in length, 80mm. in height and has a diameter of 60mm. All the other shells in the collection are from the river. The shell of the young is thin and fragile; in older specimens it becomes more solid. The surface is strongly marked by lines of growth,—the lines becoming ridges in the older shells. The umbones are prominent, but little elevated, of a greenish or bronze color. In all the specimens of this collection the umbones are eroded and marked by five elevated, wavy wrinkles arranged in two parallel rows. The ligament is quite strong and horn colored. The epidermis varies in color from a greenish yellow in the young to a dark brown in older specimens. The rays mentioned by some writers are wanting in all the specimens before me. The adductor muscle scars and the pallial line are present but not impressed. The nacre is silvery white in the young but changes to cloudy in older specimens. Some of the specimens show a deep purple nacre and copper blotches; all the specimens show iridescence.

Length	153	Height	80	Diameter	60
	99		57		44
	84		49		32
	72		38		31
	61		35		27

Symphynota Costata (Rafinesque).

Alasmidonta costata Rafinesque, Ann. Gen. Sci. Brux., V, 1820, p. 318, pl. LXXXII, figs. 15, 16.
Complanaria costata Conrad, Proc. Acad. Nat. Sci. Phil., VI, 1853, p. 261.
Symphynota costata Simpson, Syn., 1900. p. 665.
Alasmodonta rugosa Barnes, Am. Jl. Sci. ,VI, 1823, p. 278, pl. XIII, fig. 21.
Mya rugosa Eaton, Zool. Text-Book, 1826, p. 222.
Unio rugosa Hanley, Biv. Shells, 1843, p. 211. pl. XXI, fig. 8.
Baphia rugosa H & A Adams, Gen. Rec. Moll., II, 1857, p. 500.
Lasmigona rugosum Rafinesque, Cont. Mon., 1831, p. 5.
Alasmodonta hians Ferrusac, Guer. Mag., 1835, p. 25.

The shell of this species is elliptical in outliue, rather thick and heavy. It is rounded anteriorly and obtusely angulated posteriorly. The dorsal margin is straight in both sexes; the ventral margin is straight in the male and curved in the female. The lines of growth are quite heavy and form strong wrinkles on the dorsal part of the posterior angle. The umbones are eroded on all specimens in this collection, and all are marked by three almost straight, elevated ridges. The ligament is long, narrow and dark brown horn colored. The epidermis is yellowish-green to dark brown or black. The cardinal teeth are thick and heavy, pyramidal and striated on the upper surfaces. The lateral teeth are undeveloped and appear as a slight thickening of the hinge plate. The anterior adductor muscle scar is very wide, slightly impressed and iridescent. The pallial line is impressed only on the anterior portion of the shell. The cavity of the shell and of the beaks is shallow. The nacre is silvery white, bluish white or salmon colored. Old shells have a dark purple band along the entire margin of the valve.

ALASMIDONTA MARGINATA (Say).

Alasmodonta marginata Say, Nich. Encyc., 1819, 1, Jl. Ac. Nat. Sci. Phil. I. 1819, p. 459.
Margarita (*Margaritana*) *marginata* Lea, Syn., 1836, p. 43.
Alasmodonta marginata Baker, Moll. Chi. Pt. I., 1898, p. 62, pl. IV, fig 4: VII, fig. 7: XXII, fig. 3.
Unio Marginatus Sowerby, Conch. Icon., XVI, 1866, pl. LI, fig. 267
Alasmidonta truncata Simpson, Syn., 1900, p. 671.

This species should be easy to recognize on account of its heavy shell, inflated umbones that are characteristically marked with three very coarse, undulating ridges, and its truncated posterior border. The ligament is wide, not very long and of a very dark horn color. The epidermis is brownish or greenish with wide dark rays extending from the umbones to the ventral border, and dotted with black spots and dashes. The cardinal teeth are thin, elevated and striated; there is one in the right and two in the left valve. The lateral teeth are simply a thickening of the hinge. The anterior muscle scar as also the protractor are marked by lines of growth. The posterior muscle scar is only slightly impressed. The cavity of the shell is deep; that of the beaks is shallow. The pallial line is well impressed. The nacre is a bluish white, pearly and iridescent, especially on the edges of the valves.

Length	28	Height	18	Diameter	14
	42		20		18
	60		35		24
	73		37		22
	84		43		30

Quadrula Undulata (Barnes).

Unio undulatus Barnes, Am. Jl. Sci., VI, 1823, p. 120, pl. II.
Margarita (Unio) undulatus Lea, Syn., 1836, p. 12; 1838, p. 14.
Mya undulata Eaton, Zool. Text-Book, 1826, p. 219.
Unio undulata Valenciennes, Rec. Obs. Zool. Anat, II, 1833, p. 229, pl. LIV, figs. 3, 3a, 3b.
Quadrula undulata Baker, Moll. Chi., Pt. I, 1898, p. 82, pl. XXII, fig. 1, 2.
Crenodonta undulata Ortmann, Ann. Car. Mus. VIII, 1912, p. 246.
Unio costatus Conrad, Monog., II, 1836, p. 17. pl. VII.
Plectomerus costatus Conrad, Proc. Acad. N. Sci. Phila., VI, 1853, p. 260.
Unio plicatus Kuster, Conch. Cab., 1856, p. 137, pl. XL, fig. 3.
Unio atrocostatus Sowerby, Conch. Icon., XVI, 1868, pl. LXXVII, fig. 404.

This is a very heavy shell, somewhat elongated and irregularly rhomboid in outline. A characteristic feature of this species is the sculpture consisting of five strong ridges that are swollen where they cross the posterior ridge. There are oblique folds on the posterior portion of the disk; they run nearly parallel with the posterior ridge and are sometimes broken into corrugations or pustules. The epidermis is greenish or yellowish green in young specimens; in old specimens the color changes to dark brown or black. The dorsal margin is straight; the ventral margin is slightly rounded. The lines of growth are often raised into thin scales on the ventral border. The cardinal teeth are double in both valves, equal in the left, and the anterior much smaller in the right valve. All the teeth except the anterior in the right valve are heavy thick, triangular, striated and grooved. The lateral teeth are long, thick, curved ventrally and serrated. The pallial line is deeply impressed throughout. The cavity of the beaks is broad and shallow. The nacre is silvery white and iridescent on the posterior portion; some specimens show brown blotches.

Length	64	Height	43	Diameter	23
	80		55		30
	122		78		46
	112		74		43
	155		115		53

QUADRULA RUBIGINOSA (Lea).

Unio rubiginosus Lea, Tr. Am. Phil. Soc., III, 1829, p. 427, pl. VIII, fig, 10.
Quadrula rubiginosa Baker, Moll. Chi., Pt., I, 1898, p. 77, pl. XIX, fig. 2; XX, 1.
Fusconaja rubiginosa Ortmann, Ann. Car. Mus., VIII, 1912, p. 241, figs 4, 4a
Unio flavus Conrad, Monog. m. IX, 1837, p. 74, pl. XLI, fig. 2.
Unio trigonus Sowerby, Conch. Icon., XVI, 1868, pl. LXIV, p. 322.

There are five specimens of this shell in the collection at my disposal. The measurements vary considerably from those given for the species by Call and Baker, showing that these shells are smaller. The shell is quadrate in outline and of moderate thickness. There is lateral compression and striation. The epidermis is brown or olive green,—some young specimens have rays in the umbonal region. The lines of growth are numerous and raised into ridges. The anterior margin is round; the posterior margin is curved; the ventral margin is emarginate. The umbones are small and slightly raised. The ligament is dark brown in color, thick, and short. The cardinal teeth are double in the left and single in the right valve. The lateral teeth are long, thin and plate-like. The pallial line is well marked; in some specimens, it is nearly obliterated towards the posterior end. The nacre is pure white to salmon colored. There is considerable variation within the species, especially in the shape of the posterior portion, and in its corpulency. This shell may be distinguished from *Quadrula coccinea*, which it resembles most closely, by its more angular posterior slope and its stouter and diverging cardinal teeth.

Length	90	Height	64	Diamater	33
	88		61		32
	23		17		12
	71		50		33

QUADRULA COCCINEA (Conrad).

Unio coccineus Conrad, Monog., III, 1836, p. 29, pl. XIII, fig. 1.
Quadrula coccinea Baker, Moll. Chi., Pt. 1, 1898, p 79, pl. XIV, fig. 1; pl. XIX, fig. 3.
Pleurobema coccineum Ortmann, Ann. Car. Mus., VIII, 1912, p. 263.
Unio rubens Menke, Syn., Meth. Moll., 1828, p. 90.
Unio catillus Conrad, Monog., III, 1836, p. 30, pl. XIII, fig. 2.
Unio gouldianus Ward, Jay's Catalog, 3rd. ed. 1839, p. 24.
Unio cuneus Call, Tr. Ac. Sci. St. Louis, VII, p. 14.

This is an exceedingly variable species and one of the most difficult to diagnose. Its nearest relative is *Q. solida*. It may be

distinguished from this by a greater compression, lower beaks, no full median radial swelling and an absence of a radial depression in front of the posterior ridge. There are, however, intermediates that can not be satisfactorily named. The shell is roundly quadrate or roundly elliptical, rounded before and squarely truncated behind. The surface is roughened by sharp and elevated lines of growth; older specimens show considerable erosion. The umbones are elevated and bear three large, elevated undulating wrinkles and many fine lines of growth. There is a short, wide and strong ligament, of a dark brown or horn color. The epidermis is brown or reddish brown; in very old specimens it becomes chalky. The cardinal teeth are double in both valves, nearly equal in the left, the anterior tooth only a rudiment in the right valve. The cardinal teeth are depressed, triangular, heavy and strongly serrated. The lateral teeth are long, elevated serrated and directed ventrally. The single lateral in the right valve has a depression into which the ventral tooth in the left valve fits. The anterior adductor muscle scar is deeply excavated and striated, and longer than wide; the posterior adductor muscle scar is slightly impressed, striate and confluent. The cavity of the beaks is shallow. The pallial line is barely visible to quite deeply impressed. The nacre is variable from a cloudy white to rose, pink or salmon color.

Length	47	Height	35	Diameter	22
	71		53		28
	78		59		34
	96		64		38
	108		79		50

Quadrula Tuberculata (Rafinesque).

Obliquaria (*Rotundaria*) *tuberculata* Rafinesque, Ann. Gen. Sci. Brux. V, 1820, p. 103.
Rotundaria tuberculata Agassiz, Arch. fuer Naturg., I, 1852, p. 48.
Unio tuberculatus Conrad, Monog., V, 1836, p. 43, pl. XXII.
Quadrula tuberculata Simpson, Syn., 1900, p. 795.
Unio verrucosus Barnes, Am. Jl. Sci., VI, 1823, p. 123, pl. V., fig. 6.
Margarita (*Unio*) *verrucosus* Lea, Syn., 1836, p. 16.
Mya verrucosa Eaton, Zool. Text-Book, 1826, p. 216.
Quadrula verrucosa Baker, Moll. Chi., Pt. I, 1898, p. 85, pl. XXIII.
Unio tuberculosa Valenciennes, Rec. Obs. Zool. Anat., II, 1833, p. 232.

The shell of this species is quadrate, thick, heavy and pustulate. The dorsal margin is nearly straight while the ventral margin is rounded to straight. The surface of the shell is very rough,—the roughness being caused by coarse lines of growth, tubercles and

pustules. The anterior portion is quite smooth, the pustules occupying the center of the shell from the umbones to the ventral margin. The umbones are small, directed anteriorly and marked by heavy ridges. The ligament is a dark horn color, long and wide. The epidermis varies from a dark yellow to a dark brown. The cardinal teeth are single in the right and double in the left valve, flat, large and deeply grooved. The lateral teeth are very strong, and much striated in older specimens. The anterior adductor muscle scar is oval, deeply excavated and markedly striated. The pallial line is deeply impressed anteriorly but almost not at all posteriorly. The nacre varies between a whitish hue in young specimens to a deep purple in older specimens. There is a satin finish near the beaks. The space between the pallial line and the ventral margin is a dark purple, with a thin white line running along the ventral margin.

Length	75	Height	64	Diameter	44
	118		90		48
	112		90		46
	78		63		36
	120		91		50

The river area over which collections were made is about six miles in length, extending from a point about two miles south of South Bend to Bertrand, a village just above the Michigan state line.

Notes on the Genus Atrypa, with Description of New Species.

BY CLEMENT L. WEBSTER, M. SC.

INTRODUCTION.

For many years I have been engaged in bringing together from the rocks of all geological ages containing them from various parts of the world, a very large collection of all available species and variations of the Genus *Atrypa*, for the purpose of a monographic revision of the group, and for the further purpose of, in so far as possible, ascertaining the genesis of species of this group. The amount and nature of the material and evidence secured has been very gratifying; and can not but aid somewhat in the solution of at least some of the important questions involved.

Through these studies and collections it has been clearly shown that the species of this genus represent a most wonderful plasticity, and demonstrates more clearly than ever the great difficulty of determining what really does in nature constitute a good "species." It is shown that with every radical (and sometimes relatively slight) change in the deposition and environment in which the various forms we call species, lived, there followed an equally great modification of the forms, and that under these conditions they were remarkably uniform and persistent in their form and character. There is no other group of ancient life perhaps which shows equally well the great plasticity of species (aside from the Stromatoporas and their allied forms) than do the forms of the genus Atrypa. Specific names are here given to certain forms of the genus more for the sake of convenience in reference and to facilitate the further studies of others, rather than to the belief that they always constitute true natural species—in fact I am convinced that in nature, relatively few natural "species," such as have been generally regarded as such, really exist.

Nearly all the Atrypae described in this paper save *A. owenensis*, and *A. subhannibalensis*, have been referred by geologists to *Atrypa reticularis*.

In the following description of forms it will often prove difficult for the student to fully appreciate the importance of the differences existing between them without good illustrations being shown; this, however, will be overcome in the final Monograph of which this paper is to form a part.

Description of Species.

Atrypa owenensis N. Sp.

Plate VIII. Figs. 12–14.

Shell small usually not over half inch in width; length equal to or considerably greater than width.

Valves usually greatly convex and often nearly equally so; beak sharply incurved; plications rather coarse and transverse annulations or lines of growth prominent. This species is generally unusually constant in form and size, and has a certain phase suggesting *A. impressa* of Hall. This form is gregarious in its habits, and appears to be restricted in its range to a certain limestone bed of the Upper Hackberry Group (the "Owen substage" of Fenton), Owens Grove (south exposure), Cerro Gordo County, Iowa.

Position and locality: Upper Hackberry Group ("Owen substage of Fenton), Devonian, Owens Grove (south exposure) Cerro Gordo County, Iowa.

Now in the author's collection.

Atrypa independensis N. Sp.

Plate VIII. Figs. 4–6.

Atrypa reticularis of Hall—Vol. I, Part 2, page 515, plate 6, fig's. 4 and 5, Iowa Geological Survey 1858.

This species from Independence, Iowa, is described as follows by Hall: "Shell depressed suborbicular in its young state, becoming gibbous and sinuate in its mature condition; hinge line often nearly straight, and almost equalling the width of the shell; valves nearly equally convex in the young state, the dorsal valve becoming more gibbous as the shell advances in age, and sometimes acquiring an undefined mesiul lobe down the centre. The ventral valve, in the young state, has the beak nearly straight and perforated at the apex, beco ming incurved and finally closely bent over the beak of the opposite valve: a narrow false area is sometimes observable. Shell broadly and deeply sinuate in front." Striation fine and very numerous.

This species is well marked and quite distinct from other forms in several important respects and constant in form and general expression among themselves.

Position and locality: Hard gray-white limestone of the lower portion of the Middle Devonian, Independence, Iowa, and Solon, Big Bend of Iowa river Johnson County Iowa; as well as the Devonian rocks at "East Point, east side of Lake Manitoba," Canada. All now in the author's collection.

Atrypa expansa N. Sp.

This species possesses the general form and size and very fine striation of *A. independensis* of this paper and occurs associated with it; but differs conspicuously from it and all other forms of this genus by the great development of a "marginal fringe" or "foliated expansion" of the ventral valve, thus attaining a width of 3 1-2 to 5 inches or more. This certainly is a remarkable form, and one not to be confounded with any other. This form has always been referred to *A. reticularis*, but it seems to warrant the distinction of a separate species.

This form occurs frequently at Independence, Iowa, and a few other localities in Iowa, as well as at various localities in the Devonian strata of Canada at Lake Manitoba, Dawsons Bay and other localities. This form and its almost invariable associate *A. independensis*, are remarkably constant in their respective characters. This description is made to include this form from Lake Manitoba, Canada, as well as the Iowa form. This species is illustrated in Plate 37, Fig. 8, Vol. I Part IV, of "Contributions to Canadian Paleontology, 1892"; and also illustrated by Thomas in "Plate VC, Fig's. 1 and 2, Vol. XXIII, of Proceedings of the Iowa Academy of Science, 1916."

Position and locality: Lower part of the Middle Devonian at Independence, etc. Iowa, and the Devonian rocks at Lake Manitoba etc., Canada; specimens from most all these localities being in the author's collection.

Atrypa gigantea N. Sp.

Shell very large—attaining the largest size of any species of this genus known to me; orbicular to sub-orbicular in marginal outline, but sometimes wider than high; dorsal valve strangly and broadly convex above the centre, ventral valve flat or strongly concave; plications very coarse and often bifurcating. The internal structure of the ventral valve is very coarse, strongly marked and the teeth very prominent and stout. This species is very constant in form and expression, and is greatly restricted in its range vertically and horizontally, being confined to a soft granular limestone bed of a dark yellow-brown color, in Johnson County, Iowa.

Position and locality: Known only from the lower part of the Middle Devonian, at Iowa City, Roberts Ferry, Turkey Creek and Linders quarry, Johnson County, Iowa.

Now in the author's collection.

Atrypa waterlooensis N. Sp.

Plate VIII. Figs. 1–2.

Shell orbicular in outline and sometimes a little wider than long; attains a large size; very uniform in size, structure and appearance; hinge line shorter than greatest width of the valves, closed hinge area. Dorsal valve very gibbous at or just above the centre; ventral valve flat, or strongly concave below the umbonal region, but some-

times slightly convex throughout most of its surface. Surface covered by very coarse and distant bifercating plications and usually crossed throughout by prominent lines of growth.

This species is everywhere restricted to a series of soft granular, yellow calcareous limestone beds which on weathering usually break down into a tenaceous yellow clay. The form, structure and general appearance throughout the life history of this species is remarkably uniform and persistent. At Littleton, Iowa, this form generally does not attain so great a size as elsewhere.

Position and locality: In soft, yellow, granular, calcareous' limestone just above the centre portion of the Middle Devonian, at Waterloo, Waverly and Littleton, Iowa.

All now in the author's collection.

Aitrypa waterlooensis var. **canadensis** N. Var.

Plate VIII. Fig. 3.

This variety differs from the typical form of *A. waterlooensis* mainly in its generally smaller size and less coarse bifurcating plications; and is of special interest as showing its close relationship with *A. waterlooensis* of the Iowa Devonian.

Position and locality: Blue shales of the Upper Devonian age, Hay River, N. W. Territory, Canada, and Blue shale of Upper Devonian age on Hay River, 40 miles south of Great Slave Lake, N. W. Territory, Canada. Now in the author's collection.

Atrypa lineata N. Sp.

Plate VIII. Figs. 7–8.

Orbicular in outline to sometimes longer than wide. Dorsal valve moderately to strongly convex at or just above the centre and sometimes developing a strong mesial fold at the front of the valve; Hinge line considerably shorter than the greatest width of the valves; area closed and beaks sharply incurved; ventral valve flattened and often concave while somewhat convex below the beak, and sometimes developing a deep mesial sinus in front.

This species generally attains a large size, and throughout its life history, is very constant and uniform in appearance and form. Surface marked by fine striae which often bifurcate, and crossed by more or less numerous annulations of growth.

Position and locality: This form occurs abundantly in a soft granular, yellow calcareous limestone between the two nodular

Stromatopora reefs just below the iron bridge, at Treats quarry, Kelleys Quarry, at Charles City, Iowa, in the upper part of the Middle Devonian.

Now in the author's collection.

Atrypa subhannibalensis N. Sp.

Plate VIII. Figs. 15–16.

Shell of medium size, wider than high, both valves convex; dorsal valve extremely convex with greatest convexity about the centre, prominent elevation in the centre corresponding to a mesial fold and especially strong at the front margin of the valve; cardinal extremities rounded; ventral valve much less convex than the dorsal with a prominent mesial sinus especially well developed on the front margin of the valve; hinge line much shorter than the greatest width of the valves, area closed, beak sharply incurved, perforation of ventral beak not well made out. Surface marked by many strong and prominent imbricating lines of growth, and and at times these lines are marked by broad and slight elevations.

In general appearance this form might be considered as occupying a position between the genus Atrypa and the genus Athyris, although I am convinced it really is referable to the former. Ingeneral appearance and expression also it has a quite strong resem blance to *Athyris Hannibalensis* of the Carboniferous above.

Position and locality: Upper Hackberry Group, (equivalent of the "Owen Sub-Stage" of Fenton) Devonian, Owens Grove (south exposure), Cerro Gordo County, Iowa.

Now in the author's collection.

Atrypa aspera var. *occidentalis*, Hall.

This variety of *A. aspera* occurs abundantly at Independence, Waverly, Janesville, and a few other localities, in Iowa, and is a typical western form. Through the kindness of Professor E. M. Kindle, chief paleontologist of the Canadian Geological Survey, I have received identically the same variety from the upper part of the Manitoba formation (Devonian), Red Deer River, Manitoba, Canada.

This is a fact of much scientific interest. Professor Kindle is now at work on his great collection of Devonian fossils from the Northwest Territory, Canada, and his conclusions on the corelation of fauna—especially as they relate to the fauna of the Canadian

and Iowa Devonian—will be awaited with special interest. The prevailing form of *Atrypa aspera* var. *occidentalis* as it occurs in the Iowa Devonian, is illustrated by Hall in Plate 6, Fig's. 3a,—3b, Vol. I, Part I, Iowa Geological Survey, 1858; and in Plate 53A, Fig's, 19-21 Paleontology of N. Y. Vol. 4.

Atrypa lineata var. **inflata** N. Var.

This form differs widely from *A. lieata*, but it has seemed best to consider it as a variety of this species. It is a well marked variety, being very uniform in outline and form; is longer than wide, more or less sharply rounded in front; very evenly and strongly inflated especially the dorsal valve, while the ventral valve sometimes has a broad even concave area in front; beaks small and sharply incurved; perforation small; hinge line less than greatest width of the valves, straight or broadly triangular. Surface marked by fine striae, sometimes implanted and bifurcating.

Position and locality: From lower Stromatopora reef, upper part of the Middle Devonian, at Scriptures quarry and Bloody Run, three miles southeast from Charles City, Iowa, and from a few other localities in Iowa.

Now in the author's collection.

Atrypa devoniana N. Sp.

Plate VIII. Figs. 9–11.

Shell ranging from small to medium size, orbicular to suborbicular in marginal outline, and sometimes longer than wide.

Ventral valve flattened or gently concave and much more prominently so in the umbonal region; front part of the valve generally somewhat concave or developing a slight to profound undefined sinus; beak low, sharply incurved, area closed and perforation usually very distinct. Dorsal valve generally very convex especially so just above the centre, and in young and immature forms less prominently so. Surface marked by many fine striae which are increased by bifurcation and implantation, but almost wholly so by the former; and generally crossed by faint or sometimes slightly prominent lines of growth, but sometimes this feature is wanting. This is the most beautiful species of the genus occurring in the Hackberry Group, and is constant in form and expression throughout its life history.

Position and locality: Occurs abundantly throughout the

Hackberry Group in Iowa, especially in the Lower and Middle Hackberry. A closely related variety of this species occurs in the lower and middle Devonian at Independence, and Pine Creek, Iowa.

Now in the author's collection.

Atrypa spinosa var. **lindere** N. Var.

This is a relatively small form, and a well marked western variety at least of the New York A. *spinosa* of Hall; it in fact stands midway between certain of the coarse ribbed Atrypas of the western Devonian which have generally been referred to *A. reticularis*, and the eastern form of *A. spinosa*. It is much smaller and coarser ribbed than the typical forms of this species occurring in the Devonian of the Canadian northwest. It is plano-convex to concavo-convex. It has an extreme width of ½ to 1 inch, is well defined and constant in form and expression.

Position and locality: This form occurs in the lower portion of the middle Devonian at Linders quarry 3 miles north from Iowa City, Iowa, and is sometimes met with at a few other points in Johnson County, Iowa.

Now in the author's collection.

Explanation of Plate.

Figs. 1-2.—*Atrypa waterlooensis*. N. Sp.
Ventral and dorsal views of two specimens of this species.

Fig. 3.—*Atrypa waterlooensis canadensis*. N. Var.
Dorsal view of one specimen of this variety

Figs. 4-6.—*Atrypa independensis*. N. Sp.

Fig. 4. Dorsal view of a specimen of this species in the collection of C. L. Fenton, showing the normal shape of a rather young shell. Fig. 5: Dorsal view of another specimen of this species, showing a less common elongated form. Fig. 6: Cross section of a young shell.

Figs. 7-8.—*Atrypa lineata inflata*. N. Var.
Lateral and dorsal views of a very gibbous specimen of this species in the collection of C. L. Fenton. From the parting between the two nodular Stromatoporoid beds at Charles City, Iowa.

Figs. 9-11.—*Atrypa devoniana*. N. Sp.
Dorsal, lateral and dorsal views of three specimens of this species. Fig. 11 represents the normal size and shape of an adult specimen.

Figs. 12-14.—*Atrypa owensis*. N. Sp.
Lateral, dorsal and ventral views of three type specimens of this species.

Figs. 15-16.—*Atrypa subhannibalensis*. N. Sp.
Front and dorsal views of the type specimen.

The Winters of North-Central Iowa.

BY HOWARD CLARK BROWN.

To the Iowan whose loss of perfect reason has driven him to California, the escape from the Iowa winter is accounted his greatest blessing. Few, indeed, of those who have formerly lived in Iowa ever consider a trip back to the prairie state in winter. It is the cold, the below zero weather, the snow drifts which they have desired to get away from. And yet all people are not so anxious. There is a strain of Iowans, often having sturdy Scotch blood in their veins, and almost certainly have they come from Canada in their journey to the States, there is such a strain which delights in the cold weather. The coldness adds vigor to their pursuits of life's varied interests. The thermometer at twenty below is only a sign for more eager greeting when once again the sun shines warm over the rolling plains as the Spring breaks upon the country. Often these persons who delight in the cold winters of Iowa have been pioneers in this Middle Western region. They have watched the stretch of plains change from a great treeless tract of loneliness to a region rich with ripening grains, dotted with human habitations, and intersperced with clustered communities.

Just such a pioneer, is Mrs. Eliza Cairns of Charles City, Iowa. Mrs. Cairns reached the Iowa prairie in December, 1858. Her brother, John Brown reached Bradford, the home of the Little Brown Church, in 1855. Both of these people delighted in recalling the oldtime, pioneer days. And a large number of their recollec- [illegible] clustered about the relentless Iowa winters. I think that we of to-day, often hearing the tales of the cold of other times, do not fully realize the fact of the latter. I was interested in probing the subject of former winters to its depth. I spent many afternoons and many long evenings listening to the tales of the pioneer as either Mrs. Cairns or my grandfather would give them to me. And though often these tales contained much hardship, much struggle, yet seldom was there any bitterness in the telling.

It is idle to try to assert that the weather of old times was more severe than it is to-day. A change of fifty years would make so little difference that human records would not denote it. The difference, after all, is in the conditions of life, and not in the change of the temperature. Life of to-day is fortified against the extreme weather of the winter season. Life of fifty years ago was open to

attack. Men are now amassed in communities. Tree rows temper the stinging gales which formerly swept, unchecked, across the prairie. But it is of interest to go back to those old times, to gather up fragments of the old pioneer life, to piece them together, and to interpret them in the light of the world of to-day. And to do this we must consult the old records of the people who then struggled in bitter opposition, against the elements.

In seeking records of the old times, I came first of all to the diary which Mrs. Cairns has kept. It is a record going back for more than half a century. A record of climate, of fall ploughings, of spring sowings, of summer harvests, in fact, a life record of many seasons, repeating itself again and again as life always does, yet adding, presenting greater possibilities, making the whole richer, more lovely than it was at any preceding year. The exceedingly mild winter of 1918-19, in North-Central Iowa might well be compared with the winter of 1854-55. That winter was so very mild that Mrs. John Kellogg of Charles City, (then St. Charles), hatched and raised chickens in December. A friend of my grandfather's, who had come to this part of the counrry in that year, wrote to him in Canada that the winters were very mild in Iowa. He said that he had chopped wood in his shirt sleeves all winter. The next spring, Mr. Brown set out for Iowa. And, in accordance with his friend's description of the climate, he thought it unnecessary to bring his overcoat. The first winter he was here, 1855-56, it became so very cold that all of the thermometers of that time failed to register the temperature. All of them froze up. On one particular day no one was found in the cabin at which grandfather was staying, who would volunteer to go out after wood. But he, with true pioneer pluck, went out, alone. He had sent for his overcoat, in the meantime, but it had to come from McGregor by wagon, and on the way it was lost off the load. The owner never received it until sometime in January.

In 1876 Mrs. Cairns recorded that it was cloudy on December 25th, and that "roads were in a terrible condition of mud." December 28th of this same year found men ploughing.

Christmas day of 1884 was a splendid day with no snow at all, and roads were dusty in places. On the 27th of that year there was considerable rain. It had been cold before these dates, however, for we find that on December 3rd, the roads were good, and dry. On December 4th, it was quite cold, snowy, and blowing. Then, on

December 15th, it is recorded that some were running sleighs. However, the snow disappeared entirely before Christmas time.

It was at about this same time that a terrible winter struck this middle Western region. I have little left to record that season, save a short sketch which had to do with another Grandfather, Donald George Clark. Mr. Clark had been to Dubuque on the jury and was returning home upon an especially cold winter night. He left Charles City, walking toward his farm, some six miles to the South-west. The thermometer stood at thirty-eight below zero, yet he footed it all the way. He said that he had to run from one grove to the next to keep from freezing. A terrible wind swept across the prairies. And those who awaited him at home said that he looked like a snowman when he arrived.

The deep snow fall of 1877 has been recorded by Mr. Fred Strong of Charles City. There was a sixteen inch snow fall in Floyd County in November of that year. The whole disappeared within a month, however, and no other fell during that winter. It is not hard to believe that fences would easily be buried when such falls appeared. Many children of those days remember walking across the fields, over fences, on their way to school. The only care needed was in not breaking through the crust.

December 23rd, 1886 was stormy and roads were drifting badly according to the record of Mrs. Cairns.

January 15, 1888 was very cold. The thermometer registered forty below. On December 25th of that year, the ground was all bare, and the roads were dusty. The first snow of the season came on December 26th.

On December 25th, 1889 there was no snow and the recorder writes that it is more like April than December.

In 1895 there was sleighing on that same date. 1898 was somewhat similar, and Christmas day was made merry with sleighs.

In 1904 the ground was covered with snow on January first, but not enough was present for sleighing, as there was much dust mixed with the snow. On January 3rd of the same year, it was thirty below.

The years since 1904 have been rather uneven; we have had some which brought considerable snow, and some which brought little. Some were cold and some moderate, but the most moderate of all was that of 1918-19. The year just preceding had been an exceptional one in many parts of the country for heavy snows. Blizzards,

the old-fashioned three day sort which we thought had gone forever visited Iowa again. The weather was not so cold, but the blizzards were blinding. They blocked the way of any sort of traffic. Farmers were shut in for some time. But it was not as in the old days, for there was, with most of the farmers at least, some sort of communication with the outside world. It was not long at a time that the telephones were out of order, and even if they were not usable for short periods, at least, the nearest farm was usually a few rods away. It was far different from the case with my grandparents who found only three houses between their home, more than twelve miles distant from St. Charles, and the little village. But since we are told that exceptions prove the rule, so it is in this case. For the winter of 1918-19 was certainly an exception.

In November, 1918, on the first day of the month, an American bittern was seen by the writer, in Willow Pond Bird Sanctuary, at Charles City, Iowa. On that same day, a Wilson's snipe was also seen there. The snipe was again seen on November 3rd, near the same region. And in some bushes along the creek which goes from this sanctuary to the river, a male indigo bunting was seen. This is a most unusual record for the bunting, and I believe that the snipe and the bittern are quite out of season. Of course, since the creek was not frozen, the bittern and snipe could get their necessary foods. But why the bunting should have been around is another question. The weather had been mild, indeed, yet buntings had never remained in that region in former years at all as late as that date. Had it been the only eccentricity of that season I should have thought that something was the matter with the bird, and that it could not fly. But it was very active, flew well, and seemed thoroughly alert. Besides, the other birds having lingered so long past their usual times for migration made me believe that the season was truly to be one of considerable mildness.

In November, Mahlon Palmer, a member of the Califor Naturalist Club of Charles City, found violets in bloom. On the fourteenth of that month, in Brackett's Woods, a favored wood on an old river flood plain, and only a short distance from the town, I found baby-faces, (*Anemonella thalictroides*), coming up. However, I did not find any in blossom, as I had once before in the late fall when the frost had come very early, and then warm weather had followed closely upon it. There were other signs of reawakening life, for the buds of the lilacs were greatly swollen at this time, and

were about to burst in some instances. And the gardens bore unmistakable signs of the retarded frosts.

On November 13th, 1918, Mrs. Fannie Kellogg of Charles City picked enough strawberries for a good sized dish. On December 24th, Mrs. Dutton picked cress in the garden for Christmas dinner. Mrs. H. Blunt gathered beets from the garden at this same time, and she had Johnny-jumpups in bloom. Is this not, verily, a repetition of that old winter of 1854, when men chopped wood all winter long in their shirt sleeves? So it seemed indeed. But one of the greatest notes of mildness was yet due.

On December 17th, in a creek on the Floyd Road, the writer found a frog which wiggled rather inactively away, when touched. It was in the bottom of the stream when first seen, and minnows were swimming around in the water. But when the frog was moved, it continued its journey, proving that it had not yet reached the hibernation period.

The final triumph of the season, however, was the glad chirp of a robin on December 24th. Mr. Clement L. Webster of Charles City, states that robins have been known to remain throughout the winter occasionally, when a hollow along the river offered protection from the winter winds, and when some human hand would offer them food and a crude sort of shelter. But he had no instances in late years of any remaining under any conditions. I had never before seen a robin at this season in this locality. It was a novel and joyful experience when I was summoned by telephone to the neighborhood in which the robin had been seen. It was hovering around the back porches, trying to hop in the gravelly parts underneath the porches, where there was none of the snow. When a person passed too near, however, it took to the top of some of the tall hard maples along the street. Some attempts were made to scatter food for it, but whether it ate any of the offered crumbs I can not say. Just the year before, in a wood North of town, another bird enthusiast and myself had discovered some red headed woodpeckers which were wintering with us. That was the first time during the years which we had tramped that region, at which we had ever seen the red-heads in winter. They had stored acorns in holes of their own making, in an old stump. We discovered them at their lunch counter. But now a robin was found and in the dead of winter. We began to think that Nature knew no laws at all. Whether this was a robin which had not yet migrated and

would do so later, or whether it was to remain with us all winter is not known, as I had no record for it since that date. It had been seen quite commonly in that neighborhood until the snow on the twenty-fourth. The fact that it could fly well had been definitely demonstrated again and again.

I am glad that this mild sort of winter arrived at a time when I was about to help record some of the strangenesses of it. The weather bureau took temperatures and some of the street seers noted the late open condition of the river, but the fragments which I gathered were from the fields and woods and would else have remained unnoticed. Of course, I do not think that such notes have great value, but I believe that they are very interesting, and that in such comparisons, and such only, do we come to an appreciation of what early times were like. I am truly very grateful for that record which Mrs. Cairns has kept. It is a life record of changing seasons, of storms and quiet. Through its pages the kettle drums of the prairie blizzards howl, the coyote's lonely cries are echoed in the lonely stillness of the night, the snow cracks as the crust breaks with the fleeing deer, and thus the winter goes on. The winter,—season of hunger and of want, season of cold and much misery, yet the season when men's souls are tried and tempered into the finest steel.

Birds Observed at Rum Village on October 7, 1920

BY BROTHER ALPHONSUS, C. S. C.

The day was fine. We left Notre Dame at 8.45 a. m. and arrived at the large grove that is still called Rum Village, from an old Indian settlement, at 9:30 a. m. This piece of timber is perhaps the largest and finest in the immediate vicinity of South Bend, Indiana. The city has recently purchased a portion of the grove, but the larger part is still in private hands and seemingly will soon he levelled to the ground. Already there are large clearings in it, and here and there wretched hovels have been set up. If the entire wood was bought by the city, it would make one of the finest parks in the country.

Just after we got into the grove, we discovered one pine warbler, two downy woodpeckers, and a white-brested nuthatch. This was the only pine warbler we found, although myrtle warblers were

the most plentiful species in the wood. This was the first time we had seen the myrtle this autumn. They were most numerous in one place in the grove. With the myrtle warblers, we saw two palm warblers, many bluebirds, serveral chipping sparrows and goldfinches. This was the first time we had observed the palm warblers this month. As we advanced farther into the wood, myrtle warblers were still seen, but another species soon attracted our attention by its great abundance. This was the hermit thrush. Most of them were either on the ground or in low trees and brushes. Their rufus tails could be seen in the sunlight without using our field glasses. This was our first record of the hermit thrush this autumn. We saw no other thrushes, and this surprised us greatly. For this grove is filled with wood thrushes in spring, and we did not expect them to have migrated so early.

With the hermit thrushes we found in great abundance robins and bluebirds, especially the former. There were growing in this part of the grove many elder-berry bushes, which probably had attracted the robins. Nowhere else in the vicinity of South Bend, had we recently found robins in any abundance. At most a few individuals were heard or seen.

Gradually we left the robins and hermit thrushes behind us, and farther on we heard a flock of bronzed grackles clattering in the tree tops. Occasionally, too, we heard the more pleasing note of the cowbird. Here we saw the only sapsucker in our pathway. We had seen one on the first of the month, and these two records were all we made up to date. A single ovenbird was also found in this part of the wood, as usual walking quietly on the ground.

We were now approaching the east side of the grove, where many of the fine trees had been felled, and the branches were piled up. In the brush we found white-throated sparrows, rather abundant, and also began to meet again myrtle warblers, bluebirds and chipping sparrows. An occasional snatch of song was heard from the white-throats; from all the other species naught but call-notes.

We passed out of the grove at 11 a. m. and started up the road to catch a Michigan Street car. To do so we walked more than a mile, part of the way on the Vandalia tracks. The only species we saw here were two vesper sparrows. While walking along we counted the species we had seen, and found the number to be twenty-four. These were: bluebird, crow, goldfinch, bronzed grackle, blue jay, white-breasted nuthatch, robin, downy wood-

peaker, sapsucker, killdeer, chipping sparrow, white-throated sparrow, vesper sparrow, ovenbird, pine warbler, palm warbler, myrtle warbler, hairy woodpecker, hermit thrush, flicker, cowbird, golden-crowned kinglet, prairie horned lark, snowbird.

Indiana Audubon Society.

The Indiana Audubon Society wishes to call your attention to a few significant signs of the times.

Never before in our State have there been so many people interested in the common things of our every-day life. The birds, the trees, the flowers, are appealing to people as they have never done before. More people are beginning to see that bird life and all plant life are so inter-related that when measurers are taken to protect the birds, at the same time measurers are taken to increase our food supply.

Never before have people recognized so fully that all the wild things of our state have a right to protection, preservation, recognition, entirely independent of the amount of good or harm in dollars and cents that can be attributed to them. Each has a scientific and an esthetic value which cannot be measured and which should protect them from persecution, and above all form extinction. Much of our happiness depends on the beautiful things in nature.

Never before have so many people preached the doctrine that one of the best ways to teach Americanization is by teaching Americans of all classes to stop the abuse of our natural resources, that these are the foundation of our wealth and happiness and must be preserved.

Recognizing these present-day tendencies, the Indiana Audubon Society believes the time has come for close organization of the forces of protection and conservation, so that we can work unitedly and intelligently for the preservation and increase of our bird Life.

Our Slogan is—one thousand members for 1921.

We are counting on You as One of the thousand. Will you not also induce some of your friends to join? The expense is not great. The Active membership dues are $1.00 annually; Contributing membership $5.00 annually. You may become a Life Member for $25.00, no annual dues.

The advantages of membership are many. Some of them are as follows:

Through organized effort you can increase your opportunities for bird study and enlarge your sphere of activity for the preservation and protection of birds.

The Society is always glad to assist in the identification of birds, to furnish expert advice on the best methods of protection and increasing the number of birds on one's home grounds, how and where to place bird houses, bird baths, feeding stations, and how to rid your grounds of bird enemies.

The Society will also advise and assist in the organization of both Adult and Junior Audubon Societies, and whenever possible send one of its lecturers to aid in the organization of local societies.

The Society will furish stereopticon or illustrated lectures, both the text and the lantern slides. With these illustrated lectures any one can give a most interesting and instructive evening's entertainment without any previous expert knowledge of birds.

As a member of the Indiana Audubon Society, which in turn is a part of the National Association of Audubon Societies, you can obtain at minimum cost all the publications, educational leaflets, and standard bird books. This, in itself, is worth many times the cost of membership.

We need your assistance in carrying out our program for a greatly increased membership, for a closer organization of the bird-lovers throughout the State, for a more uniform teaching of Nature Study in the schools, and for the dissemination of literature relating to the great work of conservation.

Wont you join our organization and assist in our State-wide campaign of bird protection and conservation? You cannot make a better investment or one that will bring you greater returns or more satisfaction.

Send remittance to the Secretary,

Frank C. Evans,
Crawfordville, Indiana.